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(54) **DUAL LANE CONVERSION SYSTEM.**(30) Priority: **13.01.88 US 143585**(43) Date of publication of application:
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Description

The present invention relates to a press for converting work pieces into parts, said press having stock feed means and feeder drive means, whereby the stock feed means is mounted on a feeder carrier for feeding a strip stock into stations of tooling means.

A press according to the preamble of claim 1 is known from US-A-4,723,882. This press has a tab feeder comprising a plate which is fixed to the frame of the press by nut bolts. The crankshaft of the fixed tab feeder is coupled to a gearing, which is connected to a driveshaft and a change direction gear box. The change direction gear box is connected to a second crankshaft by a belt, this belt is driven by the main crankshaft which is coupled to the motor.

The US-A-4,568,230 describes a press for converting ends for cans and the like. This press has a tab feeder mounted on a rearwardly-extending bolster. The tab feeder is mounted to the press bed and slide such that the converting and tab forming paths are arranged in a symmetrical fashion which distributes reaction forces in a generally informal manner over the opposed work areas of the bed and slide. The tab feeder receives intermittent rotary input from the power takeoff shaft, a gear box and belts, whereby the power takeoff shaft is coupled to the motor by belts.

While presses as generally described above are known, there remain several difficulties associated with the set-up, operation and maintenance of the presses, which reduce productivity. One difficulty of prior press design is the downtime cost by inconvenient access to the tooling. A primary reason for poor service access is the necessary location of the tab stock feeder mechanism adjacent or opposite to the tooling, since only one side of the tooling is accessible for maintenance purposes. While the tab stock feeder mechanism can be disassembled for access to the tooling, such a process is time consuming and inconvenient. The machine and its timing must be totally set up again, because once the tab stock feeder is disconnected from the drive, the necessary timing is lost.

It is object of the present invention to provide a press which allows convenient access to the tooling.

The object is solved by a press wherein a feeder carrier is pivotable about a hinge line for providing service access to the press by pivoting off the feeder carrier without disconnecting the feeder drive means from the stock means.

Brief Description of the Drawings

Fig. 1 is a front elevation view of the conversion system of the present invention.

Fig. 2 is an end elevation view of the conversion system, looking from the right side of Fig 1.

Fig. 3 is a top plan view of the bolster with the lower die shoe omitted for clarity.

Fig. 4 is an enlarged front elevation view of the bolster, with portions omitted, showing the conveyor system mounted thereon.

Fig. 5 is an end elevation view of the bolster looking from the right end of Fig. 4.

Fig. 6 is an elevation view of the tab stock feeder mechanism, looking in the direction of line 6-6 of Fig. 2.

Fig. 7 is a plan view of the tab stock feeder mechanism.

Fig. 8 is an enlarged front elevation view of the tab feeder, with the cover omitted.

Fig. 9 is a side elevation view of the tab stock feeder, looking from the right side of Fig. 8.

Fig. 10 is a side elevation view of the tab stock feeder, looking from the left side of Fig. 8.

Detailed Description of the Invention

The conversion system or press is shown generally at 10 in Figs. 1 and 2. For purposes of description, the portion of the press shown in Fig. 1 will be termed the front of the machine. The right hand side as seen in Fig. 1 will be called the input side with the left hand side referred to as the output side. The side not shown in Fig. 1 will be denoted the back of the machine. The press includes a pair of legs 12 supporting a press bed 14. Certain auxiliary equipment such as a vacuum pump 16, and a vacuum manifold 18 may be attached to the press bed.

A unitary bolster 20 rests on top of the press bed 14, and is keyed thereto as at 22. It will be noted that the bolster 20 extends beyond the edges of the bed 14.

Four columns or uprights 24 are mounted on top of the bolster 20. Each column includes a way or track 25. A crown 26 is supported on top of the columns 24. The bed 14, bolster 20, columns 24 and crown 26 are fastened together by tie rods 27 extending through these components. Inside the crown is a main drive means, including a motor, crankshaft, and flywheel (not shown). The various components of the press are driven by means of mechanical connections to the crankshaft. For example, rotary down stackers 28 which place shells onto a conveyor are driven by belts connected to the crankshaft. The housings for the belts are shown at 30. They are connected to gear boxes 32. Drive shafts shown schematically at 34 connect the

gear boxes 32 to the down stackers.

A ram 36 is slidable on the ways 25. It is driven by the crankshaft in a reciprocating motion. Tooling shown generally at 38 is located between the ram 36, and the bolster 20. The tooling shown is lane and tab tooling for converting can ends. This tooling comprises the usual dies and punches required to form the ends. As is customary, the tooling is divided into upper and lower sets, including an upper die shoe 40, and a lower die shoe 42. The upper shoe 40 is affixed to the ram 36, and moves therewith. The lower die shoe is keyed to the bolster 20, as described below. The usual die fixtures and punch holders are mounted on the die shoes. A traveling vacuum box is indicated schematically at 44.

The press includes a transfer or conveyor system, including a main gear box 46 driven from the crankshaft by belt 47 (seen in Fig.4). The gear box 46 drives a head end pulley 48, which is mounted for rotation on a pair of brackets 50. The brackets are attached to the bolster. A tail end pulley 52 is mounted at the other of the bolster. It is covered by a shroud 54. An endless conveyor belt illustrated schematically at 56 is driven by the pulley 48, and revolves about pulley 52. The belt 56 has openings 57 for receiving shells.

A strip stock feeder shown generally at 58 is mounted at the back of the press, opposite the area of the tooling. This apparatus feeds a strip stock material which, in the embodiment shown, is used to make the tab parts of the can ends. Details of the stock feed mechanism 58 will be described below.

Turning now to Figs. 3-5, details of the bolster 20 and the conveyor system are shown. The bolster is an elongated slab of steel, approximately 6 inches thick. The upper surface of the bolster has a plurality of locating means in the form of keyways for establishing the positions of components mounted on the bolster, namely, the columns 24 and lower die shoe 42. There is a lateral keyway 60 for each of the columns, which is aligned with a matching keyway 62 (Fig. 4) on the bottom of the columns to precisely set the position of the columns along the length of the bolster. A key 61 fits into the matching keyways. The two columns at the rear of the bolster also have longitudinal keyways 64 (Fig. 3). These keys fix the lateral position of the rear two columns. Central keyways 66 establish the center line of the bolster. They are used to fix the lower die shoe 42 in position. They also establish a reference line for drilling the bolt holes used to mount the brackets 50. The keyways 60 and 64 are machined into the bolster with reference to the central keyways.

The bolster has vacuum supply ports 68 in communication with passages 70, which extend

through the bolster. Passages 70 are connected to the vacuum manifold 18 through mating passages in the bed 14.

The input end of the bolster has a U-shaped cutout shown at 72. The cutout forms a pair of arms 74. The U-shaped cutout 72 accommodates the tail end pulley 52 between the arms 74. Immediately adjacent the cutout, on the upper surface of the bolster is a depression 76. A saddle 78 fits in the depression 76, and carries the bearings for mounting the tail end pulley 52. A cylinder 80 is mounted between the bolster and the saddle 78 for adjusting the longitudinal position of the saddle, thereby controlling the tension on the conveyor belt 56. A pair of restraining bars 82 are fixed to the bolster arms 74 to hold the saddle in the depression 76.

The conveyor belt 56 is supported on its forward run adjacent the tail end pulley 52 by a plate 84. The plate is mounted on a bridge structure 86 attached to the bolster. The bridge 86 also supports the down stackers 28.

From the plate 84 the forward run of the conveyor progresses between two of the columns 24, and then into the area of the tooling. The forward run of the conveyor is supported in the tooling area by the vacuum box 44, as will be described in detail below. Upon leaving the tooling area, the forward run of the conveyor proceeds between the two output side columns to an output device where the finished can ends are discharged. The conveyor belt winds around the head end or drive pulley 48 to begin the return run. The return run is accommodated by a channel 88 cut in the underside of the bolster as shown in Fig. 4.

The bolster 20 provides an integrated support member for the various press components. In the embodiment shown the bolster extends beyond the columns to provide support for the transfer system or conveyor. The bolster also assures proper alignment of the components mounted thereon.

Looking now at Figs. 6-10, the stock feed mechanism 58 is shown in detail. Although it could be used to feed any type of work pieces or stock, in the illustrated embodiment it is used to feed the tab stock strip, so hereinafter the stock feeder will be referred to as the tab feeder. Since the feeder is supplying the tab stock to the tab tooling, it is located opposite or adjacent to the tab tooling, on the rear side of the machine. Thus, the tab stock is fed transversely to the direction of the main conveyor belt. As a result of this required positioning for the feeder, it blocks service access to the tooling. The present invention alleviates this difficulty by pivotally mounting the tab feeder 58 to one of the columns 24. The feeder pivots about a hinge line from its normal working position to a service position shown in phantom at 90 in Fig. 7.

The feeder components are mounted on a carrier comprising top and bottom plates 92 and 94, and first and second side plates 96 and 98. A removable cover 100 encloses the carrier on three sides.

The feeder carrier is pivotally mounted by a bracket 118, which is bolted to a column 24. The bracket includes a stiffener 120, and upper and lower extensions 122. The extensions mount bearings about which the top and bottom plates are pivotable. These bearings define a hinge line or rotational axis 124.

The first side plate 96 carries a pair of locating pads 102 and 104 (Fig. 10), which define horizontal and vertical locating surfaces, respectively. The first side plate also has a pin 106, on which a latch 108 is pivotally mounted.

The rear edge of the lower die shoe 42 has milled surfaces 110 and 112. When the feeder is in the closed or operating position, the pads 102 and 104 of the first end plate engage these milled surfaces to locate the carrier in the correct position with respect to the die shoe. Immediately adjacent these milled surfaces is a slot 114 into which a hook portion of the latch 108 fits to engage a removable bolt 116 for holding the feeder in the closed position.

The actual apparatus for feeding the tab stock is conventional, and may be purchased from Ferguson Manufacturing of St. Louis, Missouri. Briefly, that mechanism includes a right angle gear box 126 having a shaft 128, which is coaxial with the hinge line 124. Gear box 126 drives a belt 130 about an adjustable idler 132, which is mounted on the second side plate 98. The side plate has a U-shaped cutout 134 permitting passage of the belt and idler. The belt 130 drives a stock input device 136 and a stock output device 138. The stock itself is shown diagrammatically at 140 in Fig. 7. It will be understood that associated equipment, such as lube units and a scrap chopper have been omitted or only partially shown.

Mechanical power to the gear box 126 is provided through a belt 142, driven by a right angle drive 144 (Figs. 6 and 7). This drive in turn receives power from belt 146, which engages an output shaft of the main gear box 46.

It can be seen that with this drive arrangement the carrier can be rotated about the hinge line 124 without the need for disconnecting any of the belts. The timing of the tab feeders is not lost when the carrier pivots between operating and service positions. The locating surfaces on pads 102 and 104 assure that the carrier will always line up in the correct position with respect to the lower die shoe.

While a preferred form of the invention has been shown and described, it will be understood that alterations could be made thereto without de-

parting from the scope of the following claims.

Claims

- 5 1. A press (10) for converting work pieces into parts, said press (10) having stock feed means (136,138) and feeder driver means (126,130,132,142,144,146), whereby the stock feed means (136,138) is mounted on a feeder carrier (92,94,96,98) for feeding a strip stock (140) into stations of tooling means (40,42),
10 **characterized in that**
the feeder carrier (92,94,96,98) is pivotal about a hinge line (124) for providing service access to the press (10) by pivoting of the feeder carrier (92,94,96,98) without disconnecting the feeder drive means (126,130,132,142,144,146) from the stock feed means (136,138).
- 15 2. A press (10) according to claim 1, further comprising a bed (14), a plurality of columns (24) mounted on the bed and having a way (25) attached to each column, main drive means (26) mounted on the columns, a ram (36) slidable upon the ways and driven by the main drive means to reciprocate toward and away from the bed, upper and lower tooling means (40,42) attached to the ram and bed, respectively, having a plurality of stations for processing said work pieces into parts, the feeder carrier (92,94,96,98) is mounted on a column opposite the tooling means, the feeder drive means (126,130,132, 142,144,146) connected to the main drive means for driving said stock feed means, and the feeder drive means including a drive shaft (128) mounted coaxially with the hinge line so as to permit pivoting of the feeder carrier.
- 20 3. A press according to claim 2 wherein said feeder carrier further comprises locking means for locking the feeder carrier in said operating position.
- 25 4. A press according to claim 2 or 3 wherein the feeder carrier has a service position and an operating position, said drive shaft (128) providing pivoting means for pivoting said feeder carrier between said operating position and said service position.
- 30 5. A press according to claim 4 wherein said feeder carrier further comprises alignment means (102,104) for precisely aligning the timing of said stock feed means relative to said tooling means when said feeder carrier is in said operating position.
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6. A press according to claim 5 wherein said feeder drive means comprises a belt (142) associated with said drive shaft (128), both said belt and said drive shaft remaining stationary with respect to the feeder carrier and said feeder carrier is pivoted between said operating position and said service position, whereby pivoting said feeder carrier into said service position and returning it to said operating position precisely retains the timing of said stock feed means. 5 10
7. A press according to claim 5 further comprising tool shoes (42) having milled surfaces (110,112), said tool shoes disposed on said bed, and wherein said alignment means includes pads (102,104) disposed on said feeder carrier which are engageable with said milled surfaces permitting precise alignment of said stock feed means. 15 20
8. A press according to claim 3 wherein the alignment means precisely position said feeder carrier relative to said tooling means thereby permitting said stock feed means to feed stock directly into the station of the tooling means. 25
9. A press according to claim 2 wherein the alignment means precisely aligns said feeder carrier relative to said stock feed means so that strip stock is fed directly into said station of said tooling means during operation. 30

Patentansprüche

1. Presse (10) zum Umwandeln von Werkstücken in Einzelteile, wobei die Presse (10) eine Lagergutzuführung (136, 138) und eine Zuführantriebsvorrichtung (126, 130, 132, 142, 144, 146) aufweist und wobei die Lagergutzuführvorrichtung (136, 138) auf einem Zuführanrichtungsträger (92, 94, 96, 98) zum Zuführen eines Bandvorrats (140) in Stationen einer Werkzeugeinrichtung (40, 42) angebracht ist, **dadurch gekennzeichnet**, daß der Zuführanrichtungsträger (92, 94, 96, 98) schwenkbar um eine Gelenklinie (124) angeordnet ist zum Bereitstellen eines Wartungszugangs zu der Presse (10) durch Wegschwenken des Zuführanrichtungsträgers (92, 94, 96, 98), ohne die Zuführantriebsvorrichtung (126, 130, 132, 142, 144, 146) von der Lagergutzuführvorrichtung (136, 138) zu trennen. 35 40 45 50
2. Presse (10) nach Anspruch 1, die weiterhin ein Bett (14), mehrere Ständer (24), die auf dem Bett angebracht sind und eine an jedem Ständer angebrachte Führungsbahn (25) aufweisen, 55

eine Hauptantriebsvorrichtung (26), die auf die Ständer montiert ist, ein Rammbar (36), die über die Führungsbahnen gleitbar angeordnet und durch die Hauptantriebsvorrichtung angetrieben ist, um in Richtung zum und weg von dem Bett hin- und hergehend zu bewegen, obere und untere entsprechend an dem Rammbar und dem Bett angebrachte Werkzeugeinrichtungen (40, 42) umfaßt, die mehrere Stationen zum Verarbeiten der Werkstücke in Einzelteile aufweist, umfaßt, wobei der Zuführanrichtungsträger (92, 94, 96, 98) an einem Ständer gegenüberliegend den Werkzeugeinrichtungen angebracht ist, die Zuführantriebsvorrichtung (126, 130, 132, 142, 144, 146) mit der Hauptantriebsvorrichtung zum Antreiben der Lagergutzuführvorrichtung verbunden ist, und die Zuführantriebsvorrichtung eine Antriebswelle (128) umfaßt, die coaxial zur Gelenklinie angebracht ist, um ein Schwenken des Zuführanrichtungsträgers zu ermöglichen.

3. Presse nach Anspruch 2, worin der Zuführanrichtungsträger weiterhin eine Arretiereinrichtung zum Arretieren des Zuführanrichtungsträgers in der Betriebsstellung umfaßt.
4. Presse nach Anspruch 2 oder 3, worin der Zuführanrichtungsträger eine Wartungsstellung und eine Betriebsstellung aufweist, wobei die Antriebswelle (128) eine Schwenkeinrichtung zum Schwenken des Zuführanrichtungsträgers zwischen der Betriebsstellung und der Wartungsstellung umfaßt.
5. Presse gemäß Anspruch 4, worin der Zuführanrichtungsträger weiterhin eine Justiereinrichtung (102, 104) zum genauen Justieren der Taktzeit von der Lagergutzuführvorrichtung relativ zu den Werkzeugeinrichtungen umfaßt, wenn der Zuführanrichtungsträger in der Betriebsstellung ist.
6. Presse nach Anspruch 5, worin die Zuführantriebsvorrichtung einen Antriebsriemen (142) umfaßt, der mit der Antriebswelle (128) verbunden ist, wobei sowohl der Antriebsriemen und die Antriebswelle ortsfest verbleiben bezüglich des Zuführanrichtungsträgers, und der Zuführanrichtungsträger zwischen der Betriebsstellung und der Wartungsstellung geschwenkt ist, und wobei während des Schwenkens des Zuführanrichtungsträgers in die Wartungsstellung und des Zurückschwenkens in die Betriebsstellung die Taktzeit der Lagergutzuführvorrichtung genau beibehalten wird.

7. Presse nach Anspruch 5, die weiterhin einen Werkzeugauflageblock (42) mit gefrästen Oberflächen (110, 112) umfaßt, wobei der Werkzeugauflageblock auf dem Bett angeordnet ist, und worin die Justiereinrichtung Klötze (102, 104) umfaßt, die auf dem Zuführeinrichtungsträgerangeordnet sind, welche mit den gefrästen Oberflächen zum Ermöglichen eines genauen Justierens der Lagergutzuführeinrichtung in Verbindung bringbar sind. 5 10
8. Presse nach Anspruch 3, worin die Justiereinrichtung den Zuführeinrichtungsträger relativ zu den Werkzeugeinrichtung genau positioniert, um dadurch der Lagergutzuführeinrichtung zu ermöglichen, Lagergut direkt in die Station der Werkzeugeinrichtungen zuführen. 15
9. Presse nach Anspruch 2, worin die Justiereinrichtung den Zuführeinrichtungsträger relativ zu der Lagergutzuführeinrichtung genau justiert, so daß Bandvorrat direkt in die Station der Werkzeugeinrichtungen während des Betriebs zuführbar ist. 20 25

Revendications

1. Presse (10) pour convertir des pièces à usiner en parties, ladite presse (10) présentant un moyen d'amenée de matériau (136, 138) et un moyen d'entraînement d'organe d'amenée (126, 130, 132, 142, 144, 146), de manière que le moyen d'amenée de matériau (136, 138) soit monté sur un support d'organe d'amenée (92, 94, 96, 98) pour amener un matériau en bande (140) à des postes de moyens d'usinage (40, 42), caractérisée en ce que le support d'organe d'amenée (92, 94, 96, 98) est monté pivotant par rapport à une ligne d'articulation (124), pour permettre un accès d'entretien à la presse (10) en faisant pivoter le support d'organe d'amenée (92, 94, 96, 98), sans séparer le moyen d'entraînement d'organe d'amenée (126, 130, 132, 142, 144, 146) du moyen d'amenée de matériau (136, 138). 30 35 40 45
2. Presse (10) selon la revendication 1, comprenant en outre un banc (14), une pluralité de colonnes (24) montées sur le banc et présentant une glissière (25) fixée à chaque colonne, des moyens d'entraînement principaux (26) montés sur les colonnes, un coulisseau (36) susceptible de coulisser sur les glissières et entraîné par les moyens d'entraînement principaux, de façon à se rapprocher et à s'éloigner du banc, des moyens d'usinage supérieur et inférieur (40, 42) respectivement fixés au cou-

lisseau et au banc, présentant une pluralité de postes pour traiter lesdites pièces à usiner en parties, le support d'organe d'amenée (92, 94, 96, 98) étant monté sur une colonne opposée aux moyens d'usinage, les moyens d'entraînement d'organe d'amenée (126, 130, 132, 142, 144, 146) reliés aux moyens d'entraînement principaux pour entraîner lesdits moyens d'amenée de matériau et les moyens d'entraînement d'organe d'amenée comprenant un arbre d'entraînement (128) monté de façon coaxiale par rapport à la ligne d'articulation, de manière à permettre le pivotement du support d'organe d'amenée.

3. Presse selon la revendication 2, dans laquelle ledit support d'organe d'amenée comprend en outre des moyens de verrouillage pour verrouiller le support d'organe d'amenée dans ladite position de fonctionnement.
4. Presse selon la revendication 2 ou 3, dans laquelle le support d'organe d'amenée présente une position d'entretien et une position de fonctionnement, ledit arbre d'entraînement (128) présentant des moyens pivotant pour permettre le pivotement dudit support d'organe d'amenée entre ladite position de fonctionnement et ladite position d'entretien.
5. Presse selon la revendication 4, dans laquelle ledit support d'organe d'amenée comprend des moyens de mise en coïncidence (102, 104) pour faire coïncider avec précision le cadencement desdits moyens d'amenée de matériau par rapport auxdits moyens d'usinage, lorsque ledit support d'organe d'amenée se trouve dans ladite position de fonctionnement.
6. Presse selon la revendication 5, dans laquelle ledit moyen d'entraînement d'organe d'amenée comprend une courroie (142) associée audit arbre d'entraînement (128), ladite courroie et ledit arbre d'entraînement restant tous deux stationnaires par rapport au support d'organe d'amenée et ledit support d'organe d'amenée est forcé à pivoter entre ladite position de fonctionnement et ladite position d'entretien, de manière à faire pivoter ledit support d'organe d'amenée dans ladite position d'entretien et son retour vers ladite position permet de maintenir avec précision le cadencement desdits moyens d'amenée de matériau.
7. Presse selon la revendication 5, comprenant en outre des sabots d'outil (42) présentant des surfaces laminées (110, 112), lesdits sabots

disposés sur ledit banc et dans laquelle ledit moyen de mise en coïncidence comprend des tampons (102, 104) disposés sur ledit support d'organe d'amenée, qui sont susceptibles d'être mis au contact desdites surfaces laminées, ce qui permet une mise en coïncidence précise desdits moyens d'amenée de matériau.

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8. Presse selon la revendication 3, dans laquelle les moyens de mise en coïncidence disposent avec précision ledit support d'organe d'amenée par rapport auxdits moyens d'usinage, de manière à permettre auxdits moyens d'amenée de matériau d'amener un matériau directement au poste des moyens d'usinage.

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9. Presse selon la revendication 2, dans laquelle le moyen de mise en coïncidence fait coïncider avec précision ledit support d'organe d'amenée par rapport audit moyen d'amenée de matériau, de manière qu'un matériau en bande soit amené directement audit poste dudit moyen d'usinage, durant le fonctionnement.

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